REMARKS

Claims 1 to 7 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mardon et al. (US 5, 468, 995) with evidence from Easterday (Zirconium Analysis by Production Control Quantometer) in view of Rebeyrolle et al. (U.S. 5, 832, 050). Claims 1 to 2 were rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 9 of the U.S. Patent 6, 6863, 745.

Claim 1 has been adapted to a U.S. claim format.

Reconsideration of the application based on the following remarks is respectfully requested.

35 U.S.C. 103(a) Rejections

Claims 1 to 7 were rejected under 35 U.S.C. §103(a) as being unpatentable over Mardon et al. (US 5, 468, 995) with evidence from Easterday (Zirconium Analysis by Production Control Quantometer) in view of Rebeyrolle et al. (U.S. 5, 832, 050).

Mardon et al. discloses a method of manufacturing a tube for a nuclear fuel assembly, and tubes obtained thereby. The invention provides "a method of manufacturing zirconium-based alloy tubes also containing 50 ppm to 250 ppm iron, 0.8% to 1.3% by weight niobium, less than 1600 ppm oxygen, less than 200 ppm carbon and less than 120 ppm silicon." (Col. 1, lines 46 to 50).

Easterday discloses "the use of a direct reading spectrograph for a point-to-plane analysis of zirconium."

Rebeyrolle et al. discloses a zirconium based alloy, manufacturing process, and use in a nuclear reactor. "The alloy has a base composition similar to that of a zirconium alloy of known type used for the manufacture of an element intended for use in the core of a nuclear reactor, such as a cladding tube, a guide tube, or another structural elements of a fuel assembly. In addition, the alloy contains sulphur in proportion by weight of between 8 and 100 ppm and preferably between 8 and 30 ppm." (See Abstract). Rebeyrolle et al. states that "[i]n particular, the invention applies to a zirconium alloy containing by weight, from 0.3 to 0.7% of tin, from 0.3 to 0.7% of iron, from 0.1 to 0.4% of chromium, from 0.01 to 0.04% of nickel, from 70 to 120 ppm pf silicon and from 500 to 1800 ppm of oxygen." (Column 8, lines 46 to 50).

Claim 1 has been amended to recite, "a zirconium based alloy comprising, by weight:

a zirconium base;

Fe and at least one of the elements selected from the group consisting of Cr and V, a total of the contents in Fe and Cr + V being 200 to 700 ppm;

0.8% to 1.3% by weight of niobium;

1100 to 1700 ppm of oxygen;

less than 100 ppm of carbon;

10 to 35 ppm of sulfur;

less than 50 ppm of silicon and;

tin content exceeding zero and being 100 ppm or less in weight." Support found in the specification page 1, line 18, for example.

Admittedly, Mardon et al. fails to teach or show "10 to 35 ppm of sulfur," as recited in claim 1.

It is respectfully submitted that there is no teaching or motivation to combine the sulfur of Rebeyrolle with Mardon, and that one of skill in the art would not have found it obvious to combine the sulfur of Rebeyrolle et al. with the Mardon et al. alloys.

In reference to Rebeyrolle, the sulfur is added to Rebeyrolle in order for optimum improvement in creep and uniform corrosion resistance and in the nodular-corrosion resistance. (See Rebeyrolle et al. column 2, line 66 to column 3, line 5, for example).

However, Mardon already addresses exactly these concerns by providing a lower iron level. Mardon clearly states "It is important not to exceed a iron content of 250 ppm....high temperature creep drops off sharply when the iron content exceeds 250 ppm." (Col 2, lines 10 to 14). Also, Mardon et al. states "Tests showed generalized corrosion resistance in a high temperature aqueous medium representative of conditions in high pressure water reactor comparable to those of known Zr-Nb alloys having a high niobium content; they also showed hot creep strength much better than that of known alloys and very comparable to that of the best 'Zircaloy 4' alloys." (Col. 3, lines 27 to 33). The creep and corrosion resistance of Mardon are good without the sulfur. There is no reason that once of skilled in the art would turn to Rebeyrolle et al. and modify Mardon et al.

It is respectfully submitted that a fair reading of the Mardon and Rebeyrolle references, by one of skill in the art, would have found that there would have been no need to

add sulfur to Mardon, as Mardon's whole purpose is to address corrosion and creep resistance with low iron levels.

Furthermore, it is respectfully submitted that the proposed motivation at page 4, "in order to improve creep, uniform corrosion and nodular corrosion behaviors" as disclosed by Rebeyrolle would not be necessary, as Mardon already teaches addressing these exact issues in another way.

Furthermore, it is respectfully submitted that the sponge material quantities listed in Easterday are not necessarily representative of the zirconium found in Mardon, as Mardon has very low iron levels, and the combination of iron, chromium and vanadium in Easterdays far exceeds the limits in Mardon. Moreover, the concentrations once the alloy has been made are not disclosed in Easterday.

Claim 2 recites "a sheathing tube for one of a nuclear fuel rod and a guide tube for a nuclear fuel assembly, made from a zirconium based alloy also containing, by weight, Fe and at least one of the elements selected from the group consisting of Cr and V, a total of the contents in Fe and Cr + V being 200 to 700 ppm; 0.8% to 1.3% by weight of niobium, tin content exceeding zero and being 100 ppm or less, 1100 to 1700 ppm of oxygen, less than 100 ppm of carbon, 10 to 35 ppm of sulfur and less than 50 ppm of silicon, in the re-crystallized state, at least the greater part of the iron being in the form $Zr(Nb, Fe, Cr)_2$ or $Zr(Nb, Fe, V)_2$ and in which the intermetallic compounds are of a size not exceeding 200 nm."

Admittedly, Mardon et al. fails to teach or show "10 to 35 ppm of sulfur," as recited in claim 1.

It is respectfully submitted that there is no teaching or motivation to combine the sulfur of Rebeyrolle with Mardon, and that one of skill in the art would not have found it obvious to combine the sulfur of Rebeyrolle et al. with the Mardon et al. alloys.

In reference to Rebeyrolle, the sulfur is added to Rebeyrolle in order for optimum improvement in creep and uniform corrosion resistance and in the nodular-corrosion resistance. (See Rebeyrolle et al. column 2, line 66 to column 3, line 5, for example).

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temperature creep drops off sharply when the iron content exceeds 250 ppm." (Col 2, lines 10 to 14). The creep and corrosion resistance of Mardon are good without the sulfur. There is no reason that once of skilled in the art would turn to Rebeyrolle et al. and modify Mardon et al.

It is respectfully submitted that a fair reading of the Mardon and Rebeyrolle references, by one of skill in the art, would have found that there would have been no need to add sulfur to Mardon, as Mardon's whole purpose is to address corrosion and creep resistance with low iron levels.

Furthermore, it is respectfully submitted that the proposed motivation at page 4, "in order to improve creep, uniform corrosion and nodular corrosion behaviors" as disclosed by Rebeyrolle would not be necessary, as Mardon already teaches addressing these exact issues in another way.

Furthermore, it is respectfully submitted that the sponge material quantities listed in Easterday are not necessarily representative of the zirconium found in Mardon, as Mardon has very low iron levels, and the combination of iron, chromium and vanadium in Easterdays far exceeds the limits in Mardon. Moreover, the concentrations once the alloy has been made are not disclosed in Easterday.

Withdrawal of the rejection of independent claims 1 and 2 and the related dependent claims 3 to 7 under 35 U.S.C. §103(a) is respectfully requested.

With further respect to claims 4 to 6, there is no expectation that if the iron content of Easterday is changed (as it would be by Mardon) that the Cr and Vanadium contents would remain the same. Easterday's concentrations are simply not applicable to the Mardon zirconium.

Double Patenting

Claims 1 and 2 were rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 9 of U.S. Patent 6,863,745.

This obviousness-type double patenting rejection has been noted by the Applicant. If the pending claims are eventually found otherwise allowable, a terminal disclaimer would be timely filed in accordance with 37 C.F.R. §1.321 in order to obviate this obviousness-type double patenting rejection.

CONCLUSION

It is respectfully submitted that the application is in condition for allowance and applicants respectfully request such action.

If any additional fees are deemed to be due at this time, the Assistant Commissioner is authorized to charge payment of the same to Deposit Account No. 50-0552.

Respectfully submitted,

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